

**Amendments to the Abstract:**

Please replace the Abstract with the following:

The present invention provides an apparatus for performing heat-exchanging chemical reactions, such as nucleic acid amplification. The apparatus includes a reaction vessel having a chamber for holding a sample for chemical reaction and optical detection. The vessel has a rigid frame defining the side walls of the chamber, and flexible sheets attached to opposite sides of the frame to form opposing major walls of the chamber. The frame further includes a port and a channel connecting the port to the chamber. The temperature of the sample is controlled by opposing plates positioned to receive the chamber of the vessel between them. The apparatus also includes a plunger which is inserted into the channel of the vessel to seal the port and increase pressure in the chamber. The increased pressure forces the flexible major walls of the chamber to contact and conform to the surfaces of the plates, thus ensuring optimal thermal conductance between the plates and the chamber. The apparatus also includes thermal elements for heating or cooling the plates, as well as optics for detecting analytes in the sample.

An apparatus for controlling the temperature of a reaction mixture contained in a chamber of a reaction vessel comprises a thermal surface for contacting a flexible wall of the chamber and an automated machine for increasing the pressure in the chamber. The pressure increase in the chamber is sufficient to force the flexible wall to conform to the thermal surface for good thermal conductance. The apparatus also includes at least one thermal element for heating or cooling the surface to induce a temperature change within the chamber.